REMARKS

Claims 1-21 are pending in this application. Claims 1-4, 8, 9, 14-16, and 21 have been rejected under 35 U.S.C. 102(b) as anticipated by Robertson, US patent 5,857,042; claims 5-7 have been rejected under 35 U.S.C. 103(a) as obvious over Robertson in view of Baney, US patent 6,486,984; and claims 10-13 and 17-20 have been rejected under 35 U.S.C. 103(a) as obvious over Robertson in view of Baney and Ciemiewcz, US patent 6,695,493.

Applicants respectfully traverse these rejections for the reasons set out below.

The Anticipation Rejection Based on Robertson

Claim 1 calls for "an array of tightly-coupled, multi-wavelength arrays of vertical cavity surface emitting lasers (VCSELs)." Without any basis whatever, the Examiner states that "Robertson teaches a two-dimensional free space optical link comprising an array of tightly-coupled, multi-wavelength arrays of vertical cavity surface emitting lasers (VCSELS)." The description and claims in the present application are addressed to the person of ordinary skill in this technical field. This is a relatively high technical level, considering the technology involved. Any such person would recognize immediately that Robertson does not disclose "an array of tightly-coupled, multi-wavelength arrays of vertical cavity surface emitting lasers VCSELS" because this reference employs a separate lens for each emitter. The stated purpose of Robertson is to prevent the light signal from one emitter to impinge the detector intended for another emitter. The cited reference uses offsets of emitters/lenses to accomplish this (column 2, lines 5-10). This structure tells the person of ordinary skill in this technical field that the emitters in Robertson are not, and cannot be, tightly-coupled.

Upon reading Robertson, the person of ordinary skill here would not need to be told that the structure there disclosed is not tightly-coupled. That person would know the difference.

Contrary to the Examiner's statement that "tightly-coupled" is relative language, it means something specific and definable to that ordinary-skilled person. That person would not define it "in a variety of different ways." Upon reading Applicants' disclosure and claims, and reading Robertson, the person of ordinary skill would recognize immediately that "tightly-coupled" does not and cannot be ascribed to the Robertson structure, while Applicants' description, claims, and drawing clearly and consistently employs "tightly-coupled, multi-wavelength arrays of vertical cavity surface emitting lasers (VCSELS)."

Further, this very structure enables Applicants' optical link to perform in ways that differ from Robertson, using fewer components and being less elaborate.

To approach the differences of the present invention from Robertson in a different way, Robertson has a very specific goal to reduce crosstalk in a misaligned system. Applicants purposely let *all* the light beams hit one lens and send them all together to the receiver ("collimating optics for collimating the optical signals emitted from each said multi-wavelength array of VCSELs into a single uniform optical signal"). Applicants allow the light signals to interfere, rather than going to significant effort to avoid it (the purpose of Robertson), and use the multiple wavelengths to separate out the channels.

Contrary to the Examiner's statement that Fig. 3 of Robertson shows "collimating the optical signals emitting from each said multi-wavelength array of VCSELS into a single uniform optical signal," Robertson absolutely does not do that. As Fig. 3 clearly shows, each of the four emitters 16A-D is a separate emitter, not a multi-wavelength

array, and each one has a corresponding lenslet 18A-D to collimate the four separate light beams onto separate receivers 17A-D through lenslets 19A-D, respectively. What Robertson shows is completely different in structure, purpose, function, and effect. Robertson not only does not show multi-wavelength arrays of emitters, he does not even mention the term "multi-wavelength arrays."

The receiver in claim 1 is "an array of tightly-coupled optical receiver arrays, . . . wherein the wavelengths of the received signals generally match the wavelengths of the signals transmitted by said VCSEL arrays such that multiple optical wavelengths can be simultaneously communicated at high-speed from one of said VCSEL arrays to one of said receiver arrays across a very short haul channel." Robertson does not communicate multi-wavelength signals from tightly-coupled receiver arrays, but merely communicates a single collimated beam to a specific single receiver element, making sure the adjacent beams are separate and non-overlapping or interfering.

All in all, Robertson's structure, function, and purpose are so different from Applicants' claim 1 that further discussion should be unnecessary.

Claims 2-4, 8, and 9 depend from claim 1 and are believed to be allowable at least for the same reasons as is claim 1.

With respect to claim 14, as stated above, fully supported technically and logically, Robertson does not teach "an array of tightly-coupled, multi-wavelength arrays of vertical cavity surface emitting lasers (VCSELs), transmitting signals at predetermined wavelengths," nor does that reference teach "collimating optics for collimating the optical signals emitted from *each* said multi-wavelength *array* of VCSELs into a single uniform optical signal," (emphasis added). Additionally, Robertson fails to teach "an array of tightly coupled optical receiver arrays, each said receiver array being configured to

receive a signal from one of said VCSEL arrays, wherein the wavelengths of the signals received from said VCSEL arrays generally match the wavelengths of the signals transmitted by said VCSEL arrays such that multiple optical wavelengths can be simultaneously communicated at high-speed from said VCSEL arrays to said receiver arrays across a channel." Therefore, for the reasons advanced above, claims 14-16 (claims 15 and 16 depend from claim 14) are free of Robertson and are believe to be patentable.

Claim 21 calls for "an array of tightly-coupled, multi-wavelength arrays of vertical cavity surface emitting lasers (VCSELs), operating at predetermined wavelengths," as well as "an array of tightly-coupled optical receiver arrays, each said receiver array being configured to receive the signals from one of said VCSEL arrays, wherein the wavelengths of the received signals generally match the wavelengths of the signals transmitted by said VCSEL arrays such that multiple optical wavelengths can be simultaneously communicated at high-speed from one of said VCSEL arrays to one of said receiver arrays across a very short haul channel." The arguments above with respect to claim 1 apply equally here in relation to Robertson to the extent that the language of claim 21 is parallel to the language of claim 1. Claim 21 does not have the collimating optics, but still defines over Robertson in more than one way.

Rejection of Claims 5-7 under 35 U.S.C. 103(a)

Robertson has been combined with Baney for this obviousness rejection. Baney fails to teach that which Robertson fails to teach with respect to claim 1, from which claims 5-7 depend. However, it may be helpful to point out the other deficiencies of Baney with specific reference to these claims.

The Examiner states that Baney "teaches tightly-coupled optical receiver arrays wherein said receiver arrays comprise partitioned optical filters and mating photodetectors. Once again, the person of ordinary skill in this technical field would understand what "tightly-coupled" means, and would know that Baney does not teach "tightly-coupled receiver arrays." This reference has splitters prior to the filter/detector, which means that the light is specifically "split" into either separate fibers, or spacially split before hitting the filter/detector. Applicants' invention, on the other hand, requires no splitter since *all* the light is enabled to hit the tightly-coupled array of filters/detectors. The present invention is tightly-coupled so that a splitter is not needed. As defined in the claims, the different channels have different wavelengths, whereby the filters are effectively employed to provide the effect of a splitter because the wavelengths are divided by the filters to be received by the desired detectors. Actual splitters are bulky and expensive and the present invention eliminates the need for such devices.

Further by way of distinction, Baney's filters are tunable, requiring electronic control and resulting specific packaging, making it difficult to employ tightly coupled arrays.

Therefore, what claims 5-7 define are clear of Robertson and Baney, taken in any rational combination.

Rejection of claims 10-13 and 17-20 Under 35 U.S.C. 103(a)

Ciemiewcz has been combined with Robertson and Baney in rejecting these method claims. Robertson's deficiencies have been noted and apply here to the extent of the similar or related limitations which are in claim 10, as amended. This claim call for a

"method of creating a two-dimensional optical link. . . assembling a . . . VCSEL emitter array, wherein the VCSEL emitters in the array are arranged in a regular pattern and each VCSEL emitter is set for a different emissive wavelength; fabricating a receiver array, wherein the receiver array comprises a plurality of optical filters and mating photodetector arrangements . . . each . . . [having] a plurality of segments, each segment having an individual filter and a mating photodector element where each filter is configured to pass one wavelength and each photodetector converts a specific optical signal with a specified wavelength to an electrical signal."

Robertson shows no "plurality of optical filters and mating photodetector arrangements." Ciemiewcz suffers from the same lack of relevant teaching, having detectors at wavelengths to directly match the corresponding emitter wavelength. Baney, as stated previously, employs splitters followed by tunable filters 80 and broad passband filters 86 before impinging upon photodetectors 82 (Fig. 4). No technically permissible or conceptual combination of these references, based upon their respective teachings and suggestions, would make claim 10, as amended, obvious. The method of claim 10 is simply different, having a different purpose and a different result.

Claim 12 and 13 depend from claim 10 and are believed to be patentable at least from the same reasons.

Claim 17 is a method claim patterned after apparatus claim 1. It assembles "an array of tightly-coupled, multi-wavelength arrays of . . . VCSELs, wherein . . . each VCSEL emitter in the array of tightly-coupled VCSELs is set for a different emissive wavelength; collimating the optical signals emitted from each said multi-wavelength array of VCSELs into a single uniform optical signal; fabricating an array of tightly-

coupled optical receiver arrays, wherein each receiver array comprises a plurality of optical filters and mating photodetector arrangements. . . ."

Robertson's deficiencies with respect to these limitations have already been set out in detail. The limitations of Baney and Ciemiewcz with respect to the combination of claim 17 have also been discussed. Claim 17 is not met by the teachings, or suggestions, of these three references so this claim is believed to be allowable over the art of record.

Claims 18-20 depend from claim 17 and are believed to be allowable at least for the same reasons.

CONCLUSION

In view of the above claim amendments and discussion, it is believed that all of the claims in this application are in condition for allowance. Reconsideration is required. Should any issues remain unresolved, the Examiner is invited to telephone the undersigned attorney.

Respectfully submitted,

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